Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

PROCEEDINGS

OF THE

NATIONAL ACADEMY OF SCIENCES

OF THE

UNITED STATES OF AMERICA

VOLUME 5, 1919

EDITORIAL BOARD

RAYMOND PEARL, *Chairman* — EDWIN B. WILSON, *Managing Editor*
C. G. ABBOT, *Home Secretary* — GEORGE E. HALE, *Foreign Secretary*

J. M. CLARKE — H. S. JENNINGS — E. H. MOORE
H. H. DONALDSON — JACQUES LOEB — A. A. NOYES
E. B. FROST — GRAHAM LUSK — W. A. NOYES
R. A. HARPER — A. G. MAYOR — E. L. THORNDIKE
LUDVIG HEKTOEN — R. A. MILLIKAN — W. M. WHEELER

Publication Office: Williams & Wilkins Company, Baltimore
Editorial Office: Massachusetts Institute of Technology, Cambridge

Home Office of the Academy: Washington, D. C.

CONTENTS

PAGE

OFFICERS AND MEMBERS OF THE ACADEMY vii
REPORT OF THE AUTUMN MEETING, 1918 87
REPORT OF THE ANNUAL MEETING, 1919 479
AWARD OF MEDALS 492
RESEARCH GRANTS FROM TRUST FUNDS OF THE ACADEMY 492
INDEX 609

NATIONAL RESEARCH COUNCIL

MINUTES OF MEETINGS OF THE EXECUTIVE BOARD 50, 91, 299, 360, 462, 532, 603
MINUTES OF JOINT MEETINGS OF THE EXECUTIVE BOARD WITH THE COUNCIL OF THE ACADEMY 180, 189, 354, 452, 523
ORGANIZATION OF THE NATIONAL RESEARCH COUNCIL 184
EXECUTIVE ORDER ISSUED BY THE PRESIDENT OF THE UNITED STATES 188
NATIONAL RESEARCH FELLOWSHIP IN PHYSICS AND CHEMISTRY 313
MEETINGS OF THE INTERIM COMMITTEE 447, 459, 469, 528, 599
ORGANIZATION OF DIVISIONS OF SCIENCE AND TECHNOLOGY 316
SOME PROBLEMS OF SIDEREAL ASTRONOMY ..... *By Henry Norris Russell* 391

MATHEMATICS

A THEOREM ON POWER SERIES, WITH AN APPLICATION TO CONFORMAL MAPPING ..... *By T. H. Gronwall* 22
TABLES OF THE ZONAL SPHERICAL HARMONIC OF THE SECOND KIND $Q_1(z)$ AND $Q_1'(z)$ .. *By A. G. Webster and Willard Fisher* 79
ON THE REAL FOLDS OF ABELIAN VARIETIES ..... *By S. Lefschetz* 103
COVARIANTS OF BINARY MODULAR GROUPS ..... *By Oliver Edmunds Glenn* 107
THE GENERAL SOLUTION OF THE INDETERMINATE EQUATION: $Ax + By + Cz + \ldots = r$ ..... *By D. N. Lehmer* 111
ON THE MOST GENERAL CLASS L OF FRÉCHET IN WHICH THE HEINE-BOREL-LEBESGUE THEOREM HOLDS TRUE ..... *By Robert L. Moore* 206
ON A CERTAIN CLASS OF RATIONAL RULED SURFACES ..... *By Arnold Emch* 222
ON THE TWIST IN CONFORMED MAPPING ..... *By T. H. Gronwall* 248
GROUPS INVOLVING ONLY TWO OPERATORS WHICH ARE SQUARES ..... *By G. A. Miller* 272
REAL HYPERSURFACES CONTAINED IN ABELIAN VARIETIES ..... *By S. Lefschetz* 296
CONDITIONS NECESSARY AND SUFFICIENT FOR THE EXISTENCE OF A STIELTJES INTEGRAL ..... *By R. D. Carmichael* 551
TRANSFORMATIONS OF CYCLIC SYSTEMS OF CIRCLES ..... *By L. P. Eisenhart* 555

ASTRONOMY

PERTURBATIONS AND TABLES OF THE MINOR PLANETS DISCOVERED BY JAMES C. WATSON *By Armin O. Leuschner* 67
EVIDENCE OF STREAM MOTION AFFORDED BY THE FAINT STARS NEAR THE ORION NEBULA *By Adriaan van Maanen* 225
ON THE USE OF THE SPECTROSCOPIC METHOD FOR DETERMINING THE PARALLAXES OF THE BRIGHTER STARS ..... *By W. S. Adams and G. Strömberg* 228

PAGE

RELATION OF COLOR TO INTRINSIC LUMINOSITY IN STARS OF THE SAME SPECTRAL TYPE *By Frederick H. Seares* 232

THE MOTIONS IN SPACE OF SOME STARS OF HIGH RADIAL VELOCITY ..... *By W. S. Adams and A. H. Joy* 239

DEVIATIONS OF THE SUN'S GENERAL MAGNETIC FIELD FROM THAT OF A UNIFORMLY MAGNETIZED SPHERE ..... *By F. H. Seares, A. van Maanen, and F. Ellerman* 242

STUDIES OF MAGNITUDES IN STAR CLUSTERS, IX. THE DISTANCES AND DISTRIBUTION OF SEVENTY OPEN CLUSTERS ..... *By Harlow Shapley* 344

ON THE DISTRIBUTION OF THE APHELIA OF THE SECONDARY BODIES OF THE SOLAR SYSTEM ..... *By C. D. Perrine* 371

RECENT SIMULTANEOUS MEASUREMENTS OF THE SOLAR CONSTANT OF RADIATION AT MOUNT WILSON, CALIFORNIA, AND CALAMA, CHILE ..... *By C. G. Abbot* 383

SOME PROBLEMS OF SIDEREAL ASTRONOMY ..... *By Henry Norris Russell* 391

ON THE SPECTRAL LINES OF A PULSATING STAR *By Harlow Shapley and Seth B. Nicholson* 417

STUDIES OF MAGNITUDES IN STAR CLUSTERS, X. SPECTRAL TYPE B AND THE LOCAL STELLAR SYSTEM ..... *By Harlow Shapley* 443

PHYSICS

NOTE ON A CONTACT LEVER, USING ACHROMATIC DISPLACEMENT FRINGES *By Carl Barus* 39

INTERFERENTIAL CONTACT LEVER EXPERIMENTS RELATING TO THE ELASTICS OF SMALL BODIES ..... *By Carl Barus* 44

NOTE ON THE SELF-ADJUSTING INTERFEROMETER IN RELATION TO THE ACHROMATIC FRINGES ..... *By Carl Barus* 53

AN ADJUSTMENT IN RELATION TO THE FRESNEL COEFFICIENT ..... *By Carl Barus* 120

SUPERPOSED OR DUPLICATED SPECTRUM FRINGES ..... *By Carl Barus* 149

AN APPROXIMATE LAW OF ENERGY DISTRIBUTION IN THE GENERAL X-RAY SPECTRUM *By David L. Webster* 163

A COMPLETE APPARATUS FOR ABSOLUTE ACOUSTICAL MEASUREMENTS ..... *By Arthur Gordon Webster* 173

THE THERMO-ELECTRIC EQUATION $P = TdV/dT$ ONCE MORE ..... *By Edwin H. Hall* 197

ON THE X-RAY ABSORPTION WAVE-LENGTHS OF LEAD ISOTOPES ..... *By William Duane and Takeo Shimizu* 198

AN ELECTRODYNAMOMETER USING THE VIBRATION TELESCOPE ..... *By Carl Barus* 211

A NEW INSTRUMENT FOR MEASURING PRESSURES IN A GUN ..... *By A. G. Webster and L. T. E. Thompson* 259

ON THE ANGLE OF REPOSE OF WET SAND ..... *By A. G. Webster* 263

THE ELONGATION DUE TO MAGNETIZATION ..... *By C. Barus* 267

ACOUSTICAL IMPEDANCE AND THE THEORY OF HORNS AND OF THE PHONOGRAPH ..... *By Arthur Gorgon Webster* 275

ON THE POSSIBLE FORM OF THE EQUATION OF STATE OF POWDER GASES *By A. G. Webster* 286

THE RELATIVE ADSORPTION OF MIXTURES OF OXYGEN AND NITROGEN IN COCOANUT SHELL CHARCOAL ..... *By Harvey B. Lemon and Kathryn Blodgett* 289

VARIATIONS, DUE TO HEAT TREATMENT, IN THE RATE OF ADSORPTION OF AIR BY COCOANUT SHELL CHARCOAL ..... *By Harvey B. Lemon* 291

THE INTERFEROMETRY OF RAPID VIBRATIONS CHIEFLY IN RELATION TO TELEPHONE CURRENTS ..... *By C. Barus* 331

ON THE PRESSURE VARIATION OF SPECIFIC HEAT OF LIQUIDS ..... *By C. Barus* 340

A COMPARISON OF CERTAIN ELECTRICAL PROPERTIES OF ORDINARY AND URANIUM LEAD *By P. W. Bridgman* 351

RADIATION FROM A MOVING MAGNETON ..... *By H. Bateman* 367

ROTATING PROJECTILES FROM SMOOTH-BORE GUNS ..... *By C. G. Abbot* 386

PAGE
MEANS OF MEASURING THE SPEED OF PROJECTILES IN FLIGHT ..... *By C. G. Abbot* 388
A VAPOR-FREE VACUUM SEAL ..... *By A. H. Pfund* 521
THE DISPLACEMENT OF THE GRAVITATING NEEDLE IN ITS DEPENDENCE ON ATMOSPHERIC TEMPERATURES ..... *By Carl Barus* 547
RADIATIONLESS ORBITS ..... *By Edwin Bidwell Wilson* 588
THE EFFECT UPON THE ATOM OF THE PASSAGE OF AN ALPHA RAY THROUGH IT *By R. A. Millikan, V. H. Gottschalk and M. J. Kelly* 591

CHEMISTRY

THE INORGANIC CONSTITUENTS OF LOBSTER SHELLS ..... *By Frank Wigglesworth Clarke and George Steiger* 6
THE TERNARY SYSTEM CaO-MgO-SiO_2 ..... *By J. B. Ferguson and H. E. Merwin* 16
ON SOME METALLIC DERIVATIVES OF ETHYL THIOGLYCOLLATE *By Charles A. Rouiller.* 145
AN ELECTROMAGNETIC HYPOTHESIS OF THE KINETICS OF HETEROGENEOUS EQUILIBRIUM, AND OF THE STRUCTURE OF LIQUIDS ..... *By William D. Harkins* 152
HYDROGEN OVERVOLTAGE ..... *By Duncan A. MacInnes and Leon Adler* 160
THE STRUCTURE OF ATOMS AND THE OCTET THEORY OF VALENCE ..... *By Irving Langmuir* 252
SOME APPLICATIONS OF THE VARIATION OF HYDROGEN OVERVOLTAGE WITH THE PRESSURE ..... *By D. A. MacInnes and W. A. Contieri* 321
ETHYLENE CHLORHYDRIN ..... *By M. Gomberg* 424
STUDIES OF THE CONSTITUTION OF STEEL ..... *By Edward D. Campbell* 426
INFLUENCE OF IONS ON THE ELECTRIFICATION AND RATE OF DIFFUSION OF WATER THROUGH MEMBRANES ..... *By Jacques Loeb* 440
THE OZONE FORM OF HYDROGEN ..... *By Gerald L. Wendt* 518
THE CHANGE OF MOLECULAR KINETIC ENERGY INTO MOLECULAR POTENTIAL ENERGY: THE ENTROPY PRINCIPLE AND MOLECULAR ASSOCIATION ..... *By William D. Harkins* 539
NEW MEASUREMENTS OF THE VAPOR PRESSURE OF MERCURY ..... *By Alan W. C. Menzies* 558
COHESION, INTERNAL PRESSURE, ADHESION, TENSILE STRENGTH, TENSILE ENERGY, AND MOLECULAR ATTRACTION ..... *By William D. Harkins* 562
THE ADHESION BETWEEN MERCURY, WATER, AND ORGANIC SUBSTANCES, AND THE FUNDAMENTAL PRINCIPLES OF FLOTATION ..... *By William D. Harkins* 569
METALLIC SALTS OF PYRROL, INDOL AND CARBAZOL ..... *By Edward C. Franklin* 580

GEOLOGY AND PALEONTOLOGY

ON SOME FUNDAMENTALS OF PRE-CAMBRIAN PALEO-GEOGRAPHY. *By Rudolph Ruedemann* 1
THE PERCENTAGE NUMBER OF METEORITE FALLS AND FINDS CONSIDERED WITH REFERENCE TO THEIR VARYING BASICITY ..... *By George P. Merrill* 37
FALKLANDIA ..... *By J. M. Clarke* 102
SEVENTEEN SKELETONS OF MOROPUS; PROBABLE HABITS OF THIS ANIMAL ..... *By Henry Fairfield Osborn* 250
PALÆMASTODON, THE ANCESTORS OF THE LONG-JAWED MASTODONS ONLY ..... *By Henry Fairfield Osborn* 265
DISCOIDAL STRUCTURE OF THE LITHOSPHERE ..... *By Bailey Willis* 377

BOTANY

THE CAUSE OF PROLIFERATION IN BEGONIA PHYLLOMANIACA ..... *By Erwin F. Smith* 36
BUD VARIATION ..... *By A. B. Stout* 130
THE GROWTH RATE OF AN ANNUAL PLANT HELIANTHUS. *By H. R. Reed and R. H. Holland* 135
SOME ORIENTING EFFECTS OF MONOCHROMATIC LIGHTS OF EQUAL INTENSITIES ON FUCUS SPORES AND RHIZOIDS ..... *By Annie May Hurd* 201
PHENOMENA OF CELL DIVISION IN THE CAMBIUM OF ARBORESCENT GYMNOSPERMS AND THEIR CYTOLOGICAL SIGNIFICANCE ..... *By Irving W. Bailey* 283

ZOOLOGY

PAGE
FLAGELLATE AFFINITIES OF TRICHONYMPHA *By Charles Atwood Kofoid and Olive Swezy* 9
RESTORATION OF VITALITY THROUGH CONJUGATION ..... *By Gary N. Calkins* 95
THE EFFECT OF TRANSPLANTING LIMBS UPON THE FORMATION OF NERVE PLEXUSES AND THE DEVELOPMENT OF PERIPHERAL NEURONES ..... *By S. R. Detwiler* 324
ON THE ETHOLOGY OF CHITON TUBERCULATUS ..... *By W. J. Crozier and L. B. Arey* 496
THE NERVOUS ORGANIZATION OF A NUDIBRANCH ..... *By L. B. Arey and W. J. Crozier* 498

GENETICS

QUANTITATIVE RELATIONS BETWEEN CHROMATIN AND CYTOPLASM IN THE GENUS ARCELLA, WITH THEIR RELATIONS TO EXTERNAL CHARACTERS ..... *By R. W. Hegner* 19
IS THE ARRANGEMENT OF THE GENES IN THE CHROMOSOME LINEAR? ... *By W. E. Castle* 25
THE LINKAGE SYSTEM OF EIGHT SEX-LINKED CHARACTERS OF DROSOPHILA VIRILIS (DATA OF METZ) ..... *By W. E. Castle* 32
PIEBALD RATS AND THE THEORY OF GENES ..... *By W. E. Castle* 126
LINEAR ARRANGEMENT OF GENES AND DOUBLE CROSSING OVER *By Harold H. Plough* 167
THE SPATIAL RELATIONS OF GENES *By A. H. Sturtevant, C. B. Bridges, and T. H. Morgan* 168
INHERITANCE OF QUANTITY AND QUALITY OF MILK PRODUCTION IN DAIRY CATTLE *By W. E. Castle* 428
ARE THE GENES LINEAR OR NON-LINEAR IN ARRANGEMENT? ..... *By W. E. Castle* 500
ON VARIATION IN TARTARY BUCKWHEAT, FAGOPYRUM TATARICUM (L.) GAERTN. *By Jacob Zinn* 506
A BENIGN TUMOR THAT IS HEREDITARY IN DROSOPHILA ..... *By Mary B. Stark* 573

PHYSIOLOGY AND PATHOLOGY

A COMPARISON OF WHITE AND COLORED TROOPS IN RESPECT TO INCIDENCE OF DISEASE *By Lt.-Col. A. G Love and Maj. C. B. Davenport* 58
CONGENITAL ARTERIO-VENOUS AND LYMPHATICO-VENOUS FISTULAE. UNIQUE CLINICAL AND EXPERIMENTAL OBSERVATIONS ..... *By William S. Halsted* 76
AN ANALYSIS OF THE RELATION BETWEEN THE TEMPERATURE AND THE DURATION OF A BIOLOGICAL PROCESS ..... *By Selig Hecht* 146
THE TEMPERATURE OF THE HUMAN SKIN ..... *By F. G. Benedict, W. R. Miles and Alice Johnson* 218
ON THE PROBLEM OF THE PRODUCTION OF FAT FROM PROTEIN IN THE DOG ..... *By H. V. Atkinson and Graham Lusk* 246
THE INFLUENCE OF DEGENERATION OF ONE VAGUS NERVE UPON THE DEVELOPMENT OF PNEUMONIA ..... *By S. J. Meltzer and Martha Wollstein* 493
THE EFFECT OF MILLING ON DIGESTIBILITY OF GRAHAM FLOUR ..... *By C. F. Langworthy and H. J. Deuel* 514
GROWTH AND REPRODUCTION IN FOWLS IN THE ABSENCE OF CAROTINOIDS AND THE PHYSIOLOGICAL RELATION OF YELLOW PIGMENTATION TO EGG LAYING *By Leroy S. Palmer* 582
ON THE EMBRYOLOGICAL BASIS OF HUMAN MORTALITY ..... *By Raymond Pearl* 593

ANTHROPOLOGY AND PSYCHOLOGY

ON THE MEAN AGE AT DEATH OF CENTENARIANS ..... *By Raymond Pearl* 83
THE ARCHAEOLOGY OF THE SOUTHWEST: A PRELIMINARY REPORT .... *By N. C. Nelson* 114

OFFICERS AND MEMBERS OF THE ACADEMY NOVEMBER 10, 1919

OFFICERS OF THE ACADEMY

CHARLES D. WALCOTT, *President*

A. A. MICHELSON, *Vice-President* — GEORGE E. HALE, *Foreign Secretary*

F. L. RANSOME, *Treasurer* — C. G. ABBOT, *Home Secretary*

Additional Members of the Council

E. G. CONKLIN	RAYMOND PEARL	J. J. CARTY
A. A. NOYES	W. H. HOWELL	H. H. DONALDSON

MEMBERS OF THE ACADEMY

ABBOT, CHARLES GREELEY. ..... *Smithsonian Institution, Washington, D. C.*
ABBOT, HENRY L., U. S. A. ..... *23 Berkeley St., Cambridge, Mass.*
ABEL, JOHN JACOB ..... *Johns Hopkins University, Baltimore, Md.*
ADAMS, WALTER SYDNEY ..... *Solar Observatory Office, Pasadena, Cal.*
AITKEN, ROBERT GRANT ..... *Lick Observatory, Mt. Hamilton, Cal.*
ALLEN, J. ASAPH ..... *American Museum of Natural History, N. Y. City*
AMES, JOSEPH S. ..... *Johns Hopkins University, Baltimore, Md.*
BAILEY, LIBERTY HYDE ..... *Ithaca, N. Y.*
BARNARD, E. E. ..... *Yerkes Observatory, Williams Bay, Wis.*
BARUS, CARL ..... *Brown University, Providence, R. I.*
BAXTER, GREGORY PAUL ..... *T. J. Coolidge Jr. Mem. Lab., Cambridge, Mass.*
BELL, A. GRAHAM ..... *1331 Connecticut Ave., Washington, D. C.*
BENEDICT, FRANCIS GANO ..... *Nutrition Laboratory, Boston, Mass.*
BIRKHOFF, GEORGE DAVID ..... *Harvard University, Cambridge, Mass.*
BLISS, GILBERT AMES ..... *University of Chicago, Chicago, Ill.*
BOAS, FRANZ ..... *Columbia University, New York City*
BOGERT, MARSTON TAYLOR ..... *Columbia University, New York City*
BOLTWOOD, B. B. ..... *Yale University, New Haven, Conn.*
BOLZA, OSKAR ..... *Reichsgrafenstr, 10, Freiburg, Germany*
BRANNER, JOHN C. ..... *Stanford University, California*
BRIDGMAN, PERCY WILLIAMS ..... *Jefferson Phys. Lab., Cambridge, Mass.*
BRITTON, NATHANIEL LORD ..... *New York Botanical Gardens, N. Y. City.*
BUMSTEAD, HENRY ANDREWS ..... *Yale University, New Haven, Conn.*
CALKINS, GARY NATHAN ..... *Columbia University, New York City*
CAMPBELL, D. H. ..... *Stanford University, California*
CAMPBELL, WILLIAM W. ..... *Lick Observatory, Mount Hamilton, California*
CANNON, WALTER BRADFORD ..... *Harvard University, Cambridge, Mass.*
CARTY, JOHN J. ..... *Am. Telegraph and Telephone Co., N. Y. City*
CASTLE, WILLIAM ERNEST ..... *186 Payson Road, Belmont, Mass.*
CATTELL, JAMES MCK. ..... *Garrison, N. Y.*
CHAMBERLIN, THOMAS C. ..... *University of Chicago, Chicago, Ill.*
CHANDLER, CHARLES F. ..... *Columbia University, New York City*

CHITTENDEN, RUSSELL H. ..... *Sheffield Scientific School, New Haven, Conn.*
CLARKE, F. W. ..... *U. S. Geological Survey, Washington, D.C.*
CLARKE, J. M. ..... *State Museum, Albany, N. Y.*
COMSTOCK, GEORGE C. ..... *Washburn Observatory, Madison, Wis.*
CONKLIN, E. G. ..... *Princeton, N. J.*
COULTER, J. M. ..... *University of Chicago, Chicago, Ill.*
COUNCILMAN, WILLIAM T. ..... *Harvard Medical School, Boston, Mass.*
CREW, HENRY ..... *Northwestern University, Evanston, Ill.*
CROSS, WHITMAN ..... *2138 Bancroft Place, Washington, D. C.*
CURTIS, HEBER DOUST ..... *Lick Observatory, Mt. Hamilton, Cal.*
CUSHING, HARVEY ..... *Harvard University, Cambridge, Mass.*
DALL, WILLIAM H. ..... *Smithsonian Institution, Washington, D. C.*
DANA, EDWARD S. ..... *Yale University, New Haven, Conn.*
DAVENPORT, CHARLES B. ..... *Cold Spring Harbor, N. Y.*
DAVIS, WILLIAM MORRIS ..... *31 Hawthorn St., Cambridge, Mass..*
DAY, ARTHUR L. ..... *Corning Glass Works, Corning, N. Y.*
DEWEY, JOHN ..... *Columbia University, New York City.*
DICKSON, LEONARD E. ..... *University of Chicago, Chicago, Ill.*
DONALDSON, HENRY HERBERT ..... *Wistar Institute of Anatomy, Phila., Pa.*
DUNN, GANO ..... *43 Exchange Place, New York City*
DURAND, WILLIAM FREDERICK ..... *Stanford University, Cal.*
ELKIN, WILLIAM L. ..... *Yale University Observatory, New Haven, Conn.*
FEWKES, JESSE WALTER ..... *Bureau of American Ethnology, Wash., D. C.*
FLEXNER, SIMON ..... *Rockefeller Institute, New York City*
FOLIN, OTTO ..... *Harvard Medical School, Boston, Mass.*
FORBES, STEPHEN ALFRED ..... *Urbana, Ill.*
FRANKLIN, EDWARD CURTIS ..... *Stanford University, California*
FREEMAN, JOHN RIPLEY ..... *Providence, R. I.*
FROST, EDWIN B. ..... *Yerkes Observatory, Williams Bay, Wis.*
GOMBERG, MOSES ..... *University of Michigan, Ann Arbor, Mich.*
GOOCH, FRANK A. ..... *291 Edwards St., New Haven, Conn.*
GOODALE, GEORGE L. ..... *Harvard University, Cambridge, Mass.*
HALE, GEORGE E. ..... *Solar Observatory Office, Pasadena, Cal.*
HALL, EDWIN H. ..... *Harvard University, Cambridge, Mass.*
HALL, GRANVILLE STANLEY ..... *Clark University, Worcester, Mass.*
HALSTED, WILLIAM STEWART ..... *Johns Hopkins Med. School, Baltimore, Md.*
HARPER, R. A. ..... *Columbia University, New York City*
HARRISON, ROSS G. ..... *Yale University, New Haven, Conn.*
HASTINGS, CHARLES S. ..... *Yale University, New Haven, Conn.*
HAYFORD, JOHN F. ..... *Northwestern University, Evanston, Ill.*
HEKTOEN, LUDVIG ..... *629 South Wood St., Chicago, Ill.*
HENDERSON, LAWRENCE JOSEPH ..... *Harvard University, Cambridge, Mass.*
HERRICK, CHARLES JUDSON ..... *University of Chicago, Chicago, Ill.*
HILLEBRAND, WILLIAM F. ..... *Bureau of Standards, Washington, D. C.*
HOLMES, WILLIAM H. ..... *U. S. National Museum, Washington, D. C.*
HOWARD, LELAND OSSIAN ..... *U. S. Dept. of Agriculture, Washington, D. C.*
HOWE, HENRY MARION ..... *Broad Brook Road, Bedford Hills, N. Y.*
HOWELL, WILLIAM H. ..... *School of Hygiene and Public Health, Baltimore, Md.*
HUNT, REID ..... *Harvard Med. Sch., Boston, Mass.*
IDDINGS, JOSEPH P ..... *U. S. Geological Survey, Washington, D. C.*
JACKSON, CHARLES L. ..... *383 Beacon St., Boston, Mass.*
JENNINGS, HERBERT SPENCER ..... *Johns Hopkins University, Baltimore, Md.*

JEWETT, FRANK BALDWIN.....*Western Electric Co., New York, N. Y.*
JOHNSON, TREAT BALDWIN.....*Yale University, New Haven, Conn.*
JONES, WALTER.....*Johns Hopkins University, Baltimore, Md.*
KASNER, EDWARD.....*Columbia University, New York City*
KEMP, JAMES F.....*Columbia University, New York City*
LANGMUIR, IRVING.....*Gen. Electric Co., Schenectady, N. Y.*
LEUSCHNER, ARMIN O.....*University of California, Berkeley, Cal.*
LEVENE, PHŒBUS AARON THEODOR.....*Rockefeller Institute, New York City*
LEWIS, GILBERT N.....*University of California, Berkeley, Cal.*
LILLIE, FRANK RATTRAY.....*University of Chicago, Chicago, Ill.*
LINDGREN, WALDEMAR.....*Mass. Inst. of Technology, Cambridge, Mass.*
LOEB, JACQUES.....*Rockefeller Institute, New York City*
LUSK, GRAHAM.....*Cornell University Medical College, New York City*
LYMAN, THEODORE.....*Harvard University, Cambridge, Mass.*
MARK, EDWARD L.....*109 Irving St., Cambridge, Mass.*
MAYOR, ALFRED GOLDSBOROUGH.....*276 Nassau St., Princeton, N. J.*
MELTZER, SAMUEL JAMES.....*Rockefeller Institute, New York City*
MENDEL, LAFAYETTE B.....*262 Conner St., New Haven, Conn.*
MENDENHALL, CHARLES ELWOOD.....*University of Wisconsin, Madison, Wis.*
MENDENHALL, THOMAS C.....*329 North Chestnut St., Ravenna, Ohio*
MERRIAM, C. HART.....*1919 16th St., Washington, D. C.*
MERRIAM, JOHN CAMPBELL.....*University of California, Berkeley, Cal.*
MERRITT, ERNEST.....*Cornell University, Ithaca, N. Y.*
MICHAEL, ARTHUR.....*219 Parker St., Newton Center, Mass.*
MICHELSON, ALBERT A.....*University of Chicago, Chicago, Ill.*
MILLIKAN, ROBERT ANDREWS.....*University of Chicago, Chicago, Ill.*
MOORE, ELIAKIM H.....*University of Chicago, Chicago, Ill.*
MORGAN, T. H.....*Columbia University, New York City*
MORLEY, EDWARD W.....*West Hartford, Conn.*
MORSE, EDWARD S.....*Salem, Mass.*
MORSE, HARMON N.....*Johns Hopkins University, Baltimore, Md.*
MOULTON, F. R.....*University of Chicago, Chicago, Ill.*
NICHOLS, EDWARD L.....*Cornell University, Ithaca, N. Y.*
NICHOLS, ERNEST F.....*Yale University, New Haven, Conn.*
NOYES, ARTHUR A.....*Mass. Inst. of Technology, Cambridge, Mass.*
NOYES, WILLIAM A.....*University of Illinois, Urbana, Ill.*
OSBORN, H. F.....*American Museum of Natural History, New York City*
OSBORNE, T. B.....*Agricultural Experiment Station, New Haven, Conn.*
OSGOOD, WILLIAM FOGG.....*Harvard University, Cambridge, Mass.*
OSTERHOUT, WINTHROP JOHN VANLEUVEN.....*Harvard University, Cambridge, Mass.*
PARKER, GEORGE H.....*16 Berkeley St., Cambridge, Mass.*
PEARL, RAYMOND.....*School of Hygiene and Public Health, Baltimore, Md.*
PIRSSON, LOUIS V.....*41 Trumbull St., New Haven, Conn.*
PRUDDEN, T. MITCHELL.....*160 West 59th St., New York City*
PUMPELLY, RAPHAEL.....*Gibbs Avenue, Newport, R. I.*
PUPIN, MICHAEL I.....*Columbia University, New York City*
RANSOME, FREDERICK LESLIE.....*U. S. Geological Survey, Washington, D. C.*
REID, H. FIELDING.....*Johns Hopkins University, Baltimore, Md.*
REMSEN, IRA.....*Johns Hopkins University, Baltimore, Md.*
RICHARDS, THEODORE W.....*Wolcott Gibbs Mem. Lab., Cambridge, Mass.*
RIDGWAY, ROBERT.....*1030 South Morgan St., Olney, Ill.*
ROSA, EDWARD B.....*Bureau of Standards, Washington, D. C.*

RUSSELL, HENRY NORRIS.....*Princeton University, Princeton, N. J.*
SARGENT, CHARLES S.....*Arnold Arboretum, Jamaica Plain, Mass.*
SCHLESINGER, FRANK.....*Allegheny Observatory, Allegheny, Pa.*
SCHUCHERT, CHARLES.....*Yale University, New Haven, Conn.*
SCOTT, WILLIAM B.....*Princeton University, Princeton, N. J.*
SEARES, FREDERICK HANLEY.....*Mt. Wilson Obs., Pasadena, Cal.*
SETCHELL, WILLIAM ALBERT.....*University of California, Berkeley, Cal.*
SMITH, ALEXANDER.....*Columbia University, New York City*
SMITH, EDGAR F.....*University of Pennsylvania, Philadelphia, Pa.*
SMITH, ERWIN F.....*Bureau of Plant Industry, Washington, D. C.*
SMITH, THEOBALD.....*Princeton, N. J.*
SQUIER, GEORGE OWEN.....*Chief Sig. Officer, U. S. Army, Washington, D. C.*
STIEGLITZ, JULIUS.....*University of Chicago, Chicago, Ill.*
STORY, WILLIAM E.....*Clark University, Worcester, Mass.*
STRATTON, SAMUEL WESLEY.....*Bureau of Standards, Washington, D. C.*
TAYLOR, DAVID WATSON.....*Department of the Navy, Washington, D. C.*
THAXTER, ROLAND.....*Harvard University, Cambridge, Mass.*
THOMSON, ELIHU.....*Swampscott, Mass.*
THORNDIKE, EDWARD LEE.....*Columbia University, New York City*
TRELEASE, WILLIAM.....*University of Illinois, Urbana, Ill.*
TROWBRIDGE, AGUSTUS.....*Princeton University, Princeton, N. J.*
TROWBRIDGE, JOHN.....*Harvard University, Cambridge, Mass.*
ULRICH, EDWARD OSCAR.....*U. S. Geological Survey, Washington, D. C.*
VAN VLECK, E. B.....*University of Wisconsin, Madison, Wis.*
VAUGHAN, VICTOR CLARENCE.....*University of Michigan, Ann Arbor, Mich.*
VEBLEN, OSWALD.....*Princeton University, Princeton, N. J.*
VERRILL, A. E.....*53 Rolston St., Whitneyville, Conn.*
WALCOTT, CHARLES D.....*Smithsonian Institution, Washington, D. C.*
WEBSTER, ARTHUR G.....*Clark University, Worcester, Mass.*
WELCH, WILLIAM H.....*807 St. Paul St., Baltimore, Md.*
WELLS, HORACE L.....*Yale University, New Haven, Conn.*
WHEELER, WILLIAM M.....*Harvard University, Cambridge, Mass.*
WHITE, DAVID.....*U. S. Geological Survey, Washington, D. C.*
WHITE, HENRY SEELY.....*Vassar College, Poughkeepsie, N. Y.*
WHITNEY, WILLIS RODNEY.....*General Electric Co., Schenectady, N. Y.*
WILCZYNSKI, ERNEST JULIUS.....*University of Chicago, Chicago, Ill.*
WILSON, EDMUND B.....*Columbia University, New York City*
WILSON, EDWIN BIDWELL.....*Mass. Inst. Techn., Cambridge, Mass.*
WOOD, HORATIO C.....*4107 Chester Avenue, Philadelphia, Pa.*
WOOD, ROBERT W.....*Johns Hopkins University, Baltimore, Md.*
WOODWARD, ROBERT S.....*Carnegie Institution, Washington, D. C.*

SMITH, SIDNEY I.....*Yale University, New Haven, Conn*

FOREIGN ASSOCIATES

ARRHENIUS, S. A.....*Nobelinstitute, Stockholm*
BARROIS, CHARLES.....*Université, Lille*
BRØGGER, W. C.....*Universitet, Christiania*
DESLANDRES, HENRI.....*Astrophysical Observatory, Meudon*
DEWAR, SIR JAMES.....*University, Cambridge*
FORSYTH, A. R.....*Imperial College of Science and Technology, London*

GEIKIE, SIR ARCHIBALD.....*Haslemere, Surrey*
GROTH, PAUL VON.....*Universität, Munich*
HEIM, ALBERT.....*Zürich*
HILBERT, DAVID.....*Universität, Göttingen*
KAPTEYN, JOHN C.....*Rijks Universiteit, Groningen*
KLEIN, FELIX.....*Universität, Göttingen*
KÖSSEL, ALBRECHT.....*Heidelberg*
KUSTNER, KARL FRIEDRICH.....*Bonn*
LANKESTER, SIR E. RAY.....*South Kensington, London*
LARMOR, SIR JOSEPH.....*St. Johns College, Cambridge*
LORENTZ, HENDRIK ANTON.....*Rijks Universiteit, Leiden*
OSTWALD, WILHELM.....*Grossbothen, bei Leipzig*
PAVLOV, IVAN PETROVITCH.....*Inst. for Experimental Medicine, Petrograd*
PENCK, ALBRECHT.....*Universität, Berlin*
PFEFFER, WILHELM.....*Botanische Institut der Universität, Leipzig*
PICARD, CHARLES ÉMILE.....*Université, Paris*
RUTHERFORD, SIR ERNEST.....*University, Manchester*
SCHUSTER, ARTHUR.....*Secretary of the Royal Society, London*
SEELIGER, HUGO RITTER VON.....*Universität, Munich*
THOMSON, SIR JOSEPH.....*University, Cambridge*
VOLTERRA, VITO.....*Università, Rome*
VRIES, HUGO DE.....*Universiteit, Amsterdam*
WAALS, JOHANNES D. VAN DER.....*Amsterdam*
WALDEYER, WILHELM.....*Universität, Berlin*
WOLF, MAX F. J. C.....*Heidelberg*
WUNDT, WILHELM.....*Universität, Leipzig*